

Claims

- [c1] A variable-duct support assembly for mounting a duct to an airframe of an aircraft, comprising:
at least one rail having a groove;
at least one pair of support brackets coupled to said at least one rail and positioned along said groove for supporting a proximal surface of the duct; and
at least one flexible band coupled to said at least one pair of support brackets with the duct clamped therebetween, said at least one flexible band for distributing a clamping load substantially across a distal surface of the duct;
wherein said at least one pair of support brackets has a support portion distributing said clamping load substantially across said proximal surface of the duct.
- [c2] The variable-duct support assembly of claim 1 wherein said at least one rail has a series of openings formed therein for passing a series of fasteners therethrough and securing said at least one rail to the airframe.
- [c3] The variable-duct support assembly of claim 1 wherein said at least one rail has a series of openings formed therein for passing said at least one flexible band

therethrough and securing the duct to said at least one pair of support brackets and said at least one rail.

[c4] The variable-duct support assembly of claim 1 wherein each of said support brackets has at least one of a notch and an aperture formed therein for passing said flexible band therethrough and securing the duct to said at least one pair of support brackets.

[c5] The variable-duct support assembly of claim 1 wherein said at least one pair of support brackets is manufactured from a process selected from the group consisting of an injection molding process, a steelmaking process, a rolling process, a casting process, a forging process, an extrusion process, a drawing process, and a welding process.

[c6] The variable-duct support assembly of claim 1 wherein said at least one rail is manufactured from a process selected from the group consisting of an extrusion process, a steelmaking process, a rolling process, a casting process, a forging process, a drawing process, a welding process, and an injection molding process.

[c7] The variable-duct support assembly of claim 1 wherein said support portion of each of said support brackets has a substantially constant predetermined radius of

curvature for supporting a plurality of ducts sized within a predetermined range of diameters.

- [c8] The variable-duct support assembly of claim 1 wherein each of said support brackets has at least one flange extending therefrom for contacting said at least one rail within said groove and slidably coupling said support bracket to said at least one rail along a longitudinal axis of said at least one rail.
- [c9] The variable-duct support assembly of claim 1 wherein said flexible band is selected from the group consisting of a tie-wrap member, metal band, a rubber belt member, and a woven fabric belt member.
- [c10] A variable-duct support assembly for mounting a duct to an airframe, comprising:
at least one rail having a groove;
at least one pair of support brackets coupled to said at least one rail and positioned along said groove for supporting a proximal surface of the duct; and
at least one flexible band coupled to said at least one pair of support brackets with the duct clamped therebetween, said at least one flexible band distributing a clamping load substantially across a distal surface of the duct;
wherein each of said support brackets has a support

portion for distributing said clamping load substantially across said proximal surface of the duct;
wherein said support portion is a resilient belt member coupled to said support brackets, said resilient belt member for conforming to a contour of said proximal surface of duct and distributing said clamping load thereacross.

[c11] The variable-duct support assembly of claim 10 wherein each of said support brackets defines a region of elasticity within which said resilient belt member can stretch and support said substantial portion of said proximal surface of the duct.

[c12] The variable-duct support assembly of claim 11 wherein each of said support brackets has includes a pair of tab portions disposed substantially perpendicular to each other for defining said region of elasticity.

[c13] The variable-duct support assembly of claim 10 wherein said at least one rail has a series of openings formed therein for passing a series of fasteners therethrough and securing said at least one rail to the airframe.

[c14] The variable-duct support assembly of claim 10 wherein said at least one rail has a series of openings formed therein for passing said at least one flexible band

therethrough and securing the duct to said at least one pair of support brackets and said at least one rail.

[c15] The variable-duct support assembly of claim 10 wherein each of said support brackets has at least one of a notch and an aperture formed therein for passing said flexible band therethrough and securing the duct to said at least one pair of support brackets and said at least one rail.

[c16] The variable-duct support assembly of claim 10 wherein each of said support brackets has at least one of a notch and an aperture formed therein for passing said resilient belt member therethrough and securing said resilient belt member to said support bracket.

[c17] The variable-duct support assembly of claim 10 wherein said at least one pair of support brackets is manufactured from a process selected from the group consisting of an injection molding process, a steelmaking process, a rolling process, a casting process, a forging process, an extrusion process, a drawing process, and a welding process.

[c18] The variable-duct support assembly of claim 10 wherein said at least one rail is manufactured from a process selected from the group consisting of an extrusion process, a steelmaking process, a rolling process, a casting

process, a forging process, a drawing process, a welding process, and an injection molding process.

- [c19] The variable-duct support assembly of claim 10 wherein each of said support brackets has at least one flange extending therefrom for contacting said at least one rail within said groove and slidably coupling said support bracket to said at least one rail along a longitudinal axis of said at least one rail.
- [c20] The variable-duct support assembly of claim 10 wherein said flexible band is selected from the group consisting of a tie-wrap member, metal band, a rubber belt member, and a woven fabric belt member.
- [c21] The variable-duct support assembly of claim 10 wherein said at least one pair of support brackets is manufactured from a process selected from the group consisting of an injection molding process, a steelmaking process, a rolling process, a casting process, a forging process, an extrusion process, a drawing process, and a welding process.
- [c22] The variable-duct support assembly of claim 10 wherein said support portion of each of said support brackets has a substantially constant predetermined radius of curvature.

[c23] A ductwork assembly for attachment to an airframe of an aircraft, comprising:

- a plurality of ducts oriented in a substantially parallel alignment, each of said plurality of ducts having a proximal surface and a distal surface;
- a plurality of variable-duct support assemblies each including at least one rail, at least one pair of support brackets coupled to said at least one rail, and at least one flexible band coupled to said at least one pair of support brackets;

wherein said at least one rail has a groove formed therein;

wherein said at least one pair of support brackets is coupled to said at least one rail and positioned along said groove for supporting said proximal surface of said plurality of ducts; and

wherein said at least one flexible band is coupled to said at least one pair of support brackets with said plurality of ducts clamped therebetween, said at least one flexible band contacting and wrapped substantially around said distal surface of each of said plurality of ducts so as to distribute a clamping load substantially across said distal surface;

wherein each of said support brackets has a support portion for distributing said clamping load substantially

across said proximal surface.

[c24] An aircraft, comprising:
an airframe; and
a ductwork assembly integrated within said airframe,
said ductwork assembly including a plurality of ducts
and a plurality of variable-duct support assemblies for
mounting said plurality of ducts to said airframe;
wherein said plurality of ducts are oriented in a substan-
tially parallel alignment, each of said plurality of ducts
having a proximal surface and a distal surface;
wherein said plurality of variable-duct support assem-
blies each include at least one rail, at least one pair of
support brackets coupled to said at least one rail, and at
least one flexible band coupled to said at least one pair
of support brackets;
wherein said at least one rail has a groove formed
therein;
wherein said at least one pair of support brackets is cou-
pled to said at least one rail and positioned along said
groove for supporting said proximal surface of said plu-
rality of ducts; and
wherein said at least one flexible band is coupled to one
of said at least one rail and said at least one pair of sup-
port brackets with said plurality of ducts clamped there-
between, said at least one flexible band contacting and

wrapped substantially around said distal surface of each of said plurality of ducts so as to distribute a clamping load substantially across said distal surface;
wherein each of said support brackets has a support portion for distributing said clamping load substantially across said substantial portion of said proximal surface.

[c25] The aircraft of claim 24 wherein said at least one rail has a series of openings formed therein for passing said at least one flexible band therethrough and securing said plurality of ducts to said at least one pair of support brackets and said at least one rail.

[c26] The aircraft of claim 24 wherein each of said support brackets has at least one of a notch and an aperture formed therein for passing said flexible band therethrough and securing said plurality of ducts to said at least one pair of support brackets and said at least one rail.

[c27] The aircraft of claim 24 wherein said at least one pair of support brackets is manufactured from a process selected from the group consisting of an injection molding process, a steelmaking process, a rolling process, a casting process, a forging process, an extrusion process, a drawing process, and a welding process.

- [c28] The aircraft of claim 24 wherein said at least one rail is manufactured from a process selected from the group consisting of an extrusion process, a steelmaking process, a rolling process, a casting process, a forging process, a drawing process, a welding process, and an injection molding process.
- [c29] The aircraft of claim 24 wherein said support portion of each of said support brackets has a substantially constant predetermined radius of curvature for supporting said plurality of ducts each sized within a predetermined range of diameters.
- [c30] The aircraft of claim 24 wherein each of said support brackets has at least one flange extending therefrom for contacting said at least one rail within said groove and slidably coupling said support bracket to said at least one rail along a longitudinal axis of said at least one rail.
- [c31] The aircraft of claim 24 wherein said flexible band is selected from the group consisting of a tie-wrap member, metal band, a rubber belt member, and a woven fabric belt member.
- [c32] A method for installing a ductwork assembly onto an airframe, comprising:
attaching at least one pair of support brackets to at least

one rail;
positioning a proximal surface of at least one duct substantially between said at least one pair of support brackets;
positioning said at least one pair of saddle distributing a clamping load across said proximal surface of said at least one duct; and
attaching at least one flexible band to at least one of said at least one rail and said at least one pair of support brackets so as to clamp said at least one duct therebetween;
wherein attaching said at least one flexible band comprises contacting said distal surface and distributing said clamping load thereacross.

[c33] The method of claim 32 wherein positioning said at least one duct comprises:
orienting said at least one duct substantially perpendicularly to said at least one rail.

[c34] The method of claim 32 wherein positioning said at least one pair of support brackets comprises:
sliding said at least one pair of support brackets within a groove defined by said at least one rail.

[c35] The method of claim 32 wherein attaching said at least one flexible band comprises:

coupling at least one of a tie-wrap member, metal band, a rubber belt member, and a woven fabric belt member to said at least one pair of support bracket so as to clamp said plurality of ducts therebetween.